

NOAA R&D HPCS RFP

Appendix A.6

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Current R&D HPCS WAN Architecture

10 February 2017

A crucial element in developing new and more advanced models is a powerful reliable Wide Area Network (WAN) that connects the modeling researchers with their data and the research centers. To make that possible, NOAA deployed the N-Wave Science Network in 2010, which supports NOAA's Research and Development High Performance Computing Program (R&D HPCS). The R&D HPCS program supports NOAA's research in climate and weather modeling. The R&D HPCS program is comprised of computing resources supported by NOAA and Oak Ridge National Laboratory's National Climate Computer Research Center, (NCRC). The NCRC hosts Gaea, a leadership class petascale system dedicated for NOAA's science. In addition, NOAA has an HPC system at the NOAA Environmental Security Computing Center (NESCC) in Fairmont, WV; a climate post-processing and archive solution in Princeton, NJ; and an HPC system to support Hurricane Forecast Improvement Program (HFIP) in Boulder, CO. NOAA's high performance network, N-Wave, connects all of these sites to support data movement, and centralized scheduling and accounting of shared resources that are geographically separated from their user bases.

NOAA is moving hundreds of terabytes of model data per day between NCRC, NESCC and NOAA's R&D HPC user base, located across three laboratories: the Geophysical Fluid Dynamics Laboratory (GFDL) in Princeton, NJ; the National Center for Environmental Prediction (NCEP) in College Park, MD; and the Earth Systems Research Laboratory (ESRL) in Boulder, CO. The R&D HPCS program and NOAA's N-Wave Science Network increase collaboration and access to weather and climate data among scientists and researchers nationwide. N-Wave is currently a 10-gigabit Ethernet wide-area network and has the ability to scale to a 100-gigabit Ethernet as research demands increase and next-generation services are added to the network. N-Wave has assured the R&D HPCS Program's ability to maintain access and have the highest quality path to move the vast quantities of scientific data between the computing resources and the analysis and archive resources. The expanded scientific capability of these computing resources, in combination with N-Wave, will ensure NOAA's leadership in weather and climate research in solving large complex challenges.

N-Wave has been engineered and deployed to facilitate advanced communications capability for NOAA. A nationwide 10-Gigabit Multiprotocol Label Switching (MPLS) mesh that enables NOAA's scientific research and mission. N-Wave is a highly scalable, stable and secure network built using 10GB per second Wave Division Multiplexed (WDM) fiber-optic links supplied by partners in the national Research and Education (R&E) network community. N-Wave moves massive data loads from remote

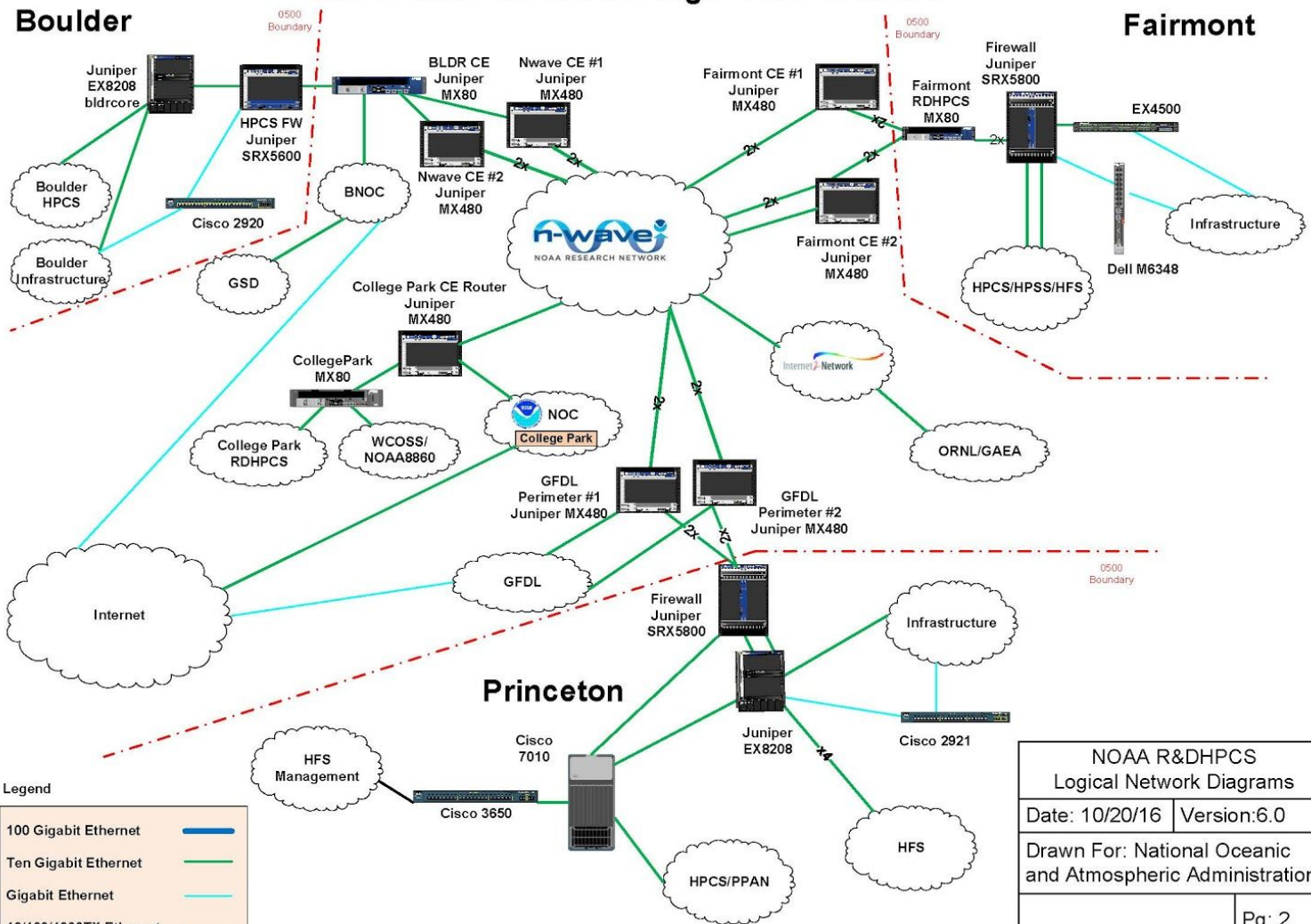
High-Performance Computing sites, as well as increases collaboration and access to weather and climate data across the scientific community. Currently N-Wave moves hundreds of terabytes of data per day and the backbone operates at or above 99.999%.

Diagrams

NOAA 0500 R&DHPCS High Level Network

Boulder

Fairmont



File: NOAA0500-Network-Diagrams-v.6.0.vsd

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| NOAA R&DHPCS Logical Network Diagrams | |
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| Date: 10/20/16 | Version: 6.0 |
| Drawn For: National Oceanic and Atmospheric Administration | |
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N-WAVE MAP



